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ABSTRACT

This booklet introduces voice output communication aids (VOCAs) used by individuals with communication disabilities. It is designed to give a "nuts and bolts" description of how and when to use a VOCA, especially in the classroom, and what to expect. Part 1 discusses the essential "people" factors in VOCA use--the educational team and the student. Part 2 provides guidelines for accommodating VOCA users in the classroom and using the device for enhancing their learning. Part 3 explores how students can benefit from VOCA as they go out into the community. Part 4 provides precautions, helpful hints, and a troubleshooting checklist. The appendixes contain a glossary; a devices and vendors list; a list of 22 journals and newsletters, organizations, and books; and a reprint of part of a "Tech Use Guide" on augmentative and alternative communication. (JDD)

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ED 389 405

TECHNOLOGY USER IN THE CLASSROOM

Augmentative Communication Devices

Carol Suddath
and
Jackie Susnik

U.S. DEPARTMENT OF EDUCATION
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EC 300 756

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March 1991

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Introduction

Communication is the sharing of one's needs, feelings, experiences, and ideas through different channels or modes. These modes of communication may be verbal (spoken, through verbal speech or speech output communication aids) or nonverbal (facial expressions, body language and orientation, gestures, and tones). Approximately 35% of what we communicate is verbal and 65% nonverbal. For example, "Honey, come here" may take on different shades of meaning, depending on the accompanying tone, body language, and facial expression of the speaker. Communication may also take a variety of forms, including spoken, written, and artistic (music and art forms).

To interact with others, we must have some understanding of what communication is and what the verbal and nonverbal messages of others mean. Our receptive language involves our ability to "make sense" of the words used by others, so that there is a common frame of reference. For example, when the word "chair" is spoken, both listener and speaker envision a similar picture or referent. Thus, an individual must have sufficient receptive language to be able to produce a message that will be understood. In cases where the overall receptive language is depressed, you should expect that use of communication technologies will be directly related to language competence. In other instances, there may be specific receptive gaps or an inability to transform receptive language into expressive communication, which will restrict or limit the ability to produce all expressive components.

Augmentative/alternative communication (AAC) can help people with both productive and receptive communication disabilities to interact with the world. AAC refers to any technique used to enhance or augment communication. For many years, people have designed and used AAC systems and strategies to communicate with nonspeaking individuals. Some of the methods used have included multiple choice questions, eye blinks, gestures, sign language, communication boards, communication books, alphabet boards, and even primitive Morse Code systems. Recent years have seen the addition of computers and environmental control systems. Most of these systems are still effective and are a part of AAC technology today. One of the most liberating pieces of technology is the voice output communication aid (VOCA).

VOCAs are stand-alone, dedicated electronic devices that produce computer-generated speech. Many VOCAs are available, each with its own distinct features and characteristics to serve the diverse needs of students with communication disabilities. Please bear in mind that, as important as the VOCA may be, it is still only part of the student's communication system. The "big picture" requires that we promote the use of all appropriate communication strategies, both verbal and nonverbal.

We've written this booklet to introduce you to VOCAs. Whether you are a primary user, parent, teacher, or speech therapist, it is designed to give you a "nuts and bolts" description of how, when, and what to expect when using a VOCA in the classroom.

Two things are critical for you to remember as you begin this new endeavor: (1) You already possess a wealth of information and skills in your field; and (2) To effectively implement technology, remember that it is a means to an end, not the end itself. More than once, it has surprised us to find out that competent service providers lose sight of this.

A brief illustration may clarify what we are trying to say. A speech language therapist was being trained on the programming of a Speech Pac voice output communication aid. During the process, she asked, "Now that the system is operational, what should I work on with this student?" Our reply was simply to ask where she placed his language skills and what would she work on with any student who was at that level. She realized that she had the training to deal effectively with this student, and that she, herself, was quite capable of developing appropriate objectives.

This story is not meant to disregard strategies that are unique to effectively using an augmentative communication system. It is, however, meant to reassure our readers that they have the prerequisites to assist students in developing their communicative potential.

VOCA-related terminology, general training techniques, common problems, and helpful hints are described to help you settle into this unfamiliar territory comfortably. Part 1 of this booklet discusses the essential "people" factors in VOCA use – the educational team and the student. Part 2 provides guidelines for accommodating VOCA users in the classroom and using the device for en-

hancing their learning. Part 3 explores how students can benefit from VOCA as they go out into the community. Part 4 provides precautions, helpful hints, and a troubleshooting checklist. The appendixes include a glossary, devices and vendors list, resources, and references.

We hope that this booklet will get you started and inspire you to delve further into the opportunities afforded by VOCA technology.

Part 1

The Educational Team and the Student

What is the Educational Team?

When a nonspeaking person enters an educational or hospital setting, he or she is evaluated to determine what AAC systems or training options might be appropriate. Individuals involved in this evaluation process might include a speech pathologist, physical therapist or occupational therapist (support staff), medical doctor or nurse, psychologist, engineer, computer technology specialist, teacher, social worker, vocational counselor, parent/direct care giver, and the student. It is important that parents and direct care staff be involved throughout this evaluation process, as well as in the training that follows. This evaluation differs across states and facilities, but the outcome includes recommendations that match the student to the training process and AAC system that best meets his or her individual personality and needs.

If possible, the student should have the opportunity to use the recommended system(s) on a trial basis, before a specific VOCA is purchased. The evaluation process, along with its documentation, is extremely important because there is no single device that is appropriate for all nonspeaking individuals. Attempts should be made to obtain a copy of this evaluation and therapy progress reports, to provide a complete picture of the student's needs and functioning level. Direct contact with members of the evaluation team, educational team, or previous support staff is also recommended. This is particularly important if you experience frustration with use of the VOCA. Although the educational team attempts to make an ideal match between user and device, for a variety of reasons, optimal decisions do not always result. Communication among evaluation team, practitioners, and users facilitates ongoing evaluation and feedback. Thus, if vocabulary revisions are required or if a different device would be deemed more suitable, a decision encompassing all three perspectives can be made.

What Do You Need to Know About the Student?

It has been said that you cannot select a VOCA for anyone until you know that person as an individual – his or her capabilities, limitations, needs, interests, hopes, and aspirations. This axiom makes sense because a VOCA is indeed an extension of the individual's personality.

You need to evaluate the student's abilities, including motor, perceptual, cognitive, social, and communication competence. You need to consider the student's physical and social environments because they are an intrinsic part of communication effectiveness. Educational and vocational goals also need to be addressed in VOCA selection.

As every experienced teacher knows, three issues are crucial to success in acquiring and using a new skill.

- The student must have appropriate opportunities to use the skill. You have to look at the student's daily schedule and determine when and where such opportunities are likely to occur. For example, if you want to encourage dialogue, you need to be aware of relaxed, uninterrupted time segments when conversation might naturally take place.
- You need to know what motivates the student. In some cases it may simply be pleasing the teacher; or it may be that the child wants to be the center of attention; or it may be a tangible reward. In the optimal scenario, the simple act of communicating will be reward enough.
- Take advantage of the student's sense of humor. It's a prime motivator for spontaneous communication and social interaction.

Obviously, you will want to evaluate these areas in some detail. There are numerous assessment tools and checklists available. For example, the INCH assessment tool (see Appendix B) offers some helpful guidelines. (Also, see Appendix C for resources and references.)

Part 2

Using the VOCA in the Classroom

How Do I Introduce VOCA Use to my Class?

The addition of a VOCA user to your classroom will probably result in some unanticipated situations. We would like to suggest the following activities that will facilitate the integration process: (a) an introduction of VOCAs and VOCA users by an informed user; (b) classroom rules, which describe and define how the VOCA will used and who will be allowed access to it; and (c) determination of places where the VOCA will or will not be used.

The presence of a VOCA in your school will create a great deal of curiosity and interest, and we suggest that you make this a learning experience for all. We recommend that you use a former teacher or parent as a resource because they have already experienced some of the concerns that you will have. You might also enlist other people in your community – perhaps a special education teacher, a speech therapist, or a university professor who has worked with VOCAs – to do a presentation at your school. Suggest that they discuss what VOCAs are, how they work, explain how a student acquires a VOCA, and give examples of how the device sounds. You might contact the vendor to ask if there is a videotape available. Being able to see a VOCA user "in action" often helps to demystify this process. You might also suggest that staff (and students) spend a period of time (30-60 minutes) as a nonspeaking individual, to bring about sensitivity to the impact of this disability.

How Will the VOCA Affect the Classroom?

Having a VOCA user in the classroom will result in many changes, including attitudes, structure, and space. Every VOCA user (just as every one of us) is a unique individual, with varying needs. The VOCA user may require special seating arrangements or methods to secure and access the device. Again, if you're not sure how to deal with wheelchairs or hardware arrangements, go to resources in your school, community, or to vendors and ask questions.

Rather than raising a hand to indicate that he or she wants to participate, the user might activate a buzzer or give eye contact to gain the attention of others. As you get to know the VOCA user, his or her methods may become evident; or you could provide options and jointly determine which will work out best within the school setting. Don't forget to use former teachers and parents as resources.

Every VOCA has different features, some of which may expand classroom performance. Some examples include: the *Light Talker's* ability to act as an alternate keyboard for a computer; the *WOLF's* ability to activate battery-operated toys in conjunction with speech production; the *SpeechPAC's* ability to act as an environmental control interface. Some VOCAs have features that can be adapted for other classroom applications.

Should Other Students Be Allowed to Touch the VOCA?

After your initial introduction, you may continue to have concerns regarding who should be responsible for the VOCA, or have access to it. Often, other students may attempt to help the VOCA user, resulting in several potential problems. First, the user should be consulted and should indicate whether or not he or she would like assistance. Sometimes, in our efforts to "help," we may fail to realize that students with disabilities want or need to do things on their own, being as independent as possible in all situations. It's fun to operate a power chair or VOCA, but your other students may need to be reminded that these are tools that belong to and help the student with disabilities participate in classroom activities. On the other hand, nonusers may be engaged to prompt or model communication strategies with the VOCA. This may be an excellent training technique, and may serve to reduce frustration when the VOCA user is confused or exposed to new tasks. It may also help other students learn language, communication, and social concepts.

How Should the VOCA Be Integrated Into the Academic Curricula?

It is impossible to detail training strategies in this booklet, but several sources of sample strategies are available through national and local organizations, such as the American Speech and Hearing Association (ASHA) and the United States Society for Augmentative and Alternative Communication

(USSAAC), which present training and curricula (see Appendix C). We suggest that you contact these organizations, explain your needs, and ask if they can provide assistance. What we can offer here are some broad-based suggestions for most classroom VOCA users. It is amazing to contemplate the cognitive processes and skills one can facilitate with a VOCA, such as the following:

- Awareness of cause and effect – simply the push of a switch produces something.
- Comprehending a means to an end and therefore learning to initiate requests. By programming a word for something that the student has demonstrated he or she consistently enjoys, and placing the VOCA in a strategic location for the student to activate, the student can learn that the VOCA is a means to an end; that is, the student activates the sound and gets the desired object.
- Indicating preferences. By programming simple choices of leisure activities or locations in the room, the teacher can encourage the student to self-determine some preferences.
- Participating in songs or nursery rhymes – learning to anticipate "events" that occur in "predictable" rhymes or stories.
- Creative, exploratory play. Children can role-play adult activities, such as talking to dolls or going to the store.
- Conveying messages. Students learn concretely communicative responsibility.
- Participating in "circle" routine activities. Rote skills such as calendar words can be elicited, class jobs chosen, and weather referred to and indicated. The visual reinforcement on overlays, as well as the auditory feedback, assists in the initial learning and retention of these concepts.
- Acquiring and displaying social rituals (courtesies), such as saying "please," "thank you," "hi," "good-bye," and "What's your name?"
- Memorizing series, such as days of the week.
- Organizing information, such as how prepositions and concept words relate to each other by seeing their graphic representation.
- Acquiring sight word recognition.
- Using the device as a "dictionary" reference when spelling.
- Developing a sense of phonics for reading and spelling. Many VOCAs have the ability to phonetically produce sounds from the English language; such a programmed level can be used during spelling, writing, and reading.
- Participating in class performances and skits.

As is apparent from this list, you should approach the VOCA user as you would any other learner in your classroom, except that this student has a machine that facilitates fuller participation. Your focus should not be centered around teaching the student how to use the VOCA, but rather using the device as a learning tool.

We encourage teachers to learn to program VOCAs, enlisting support from previous teachers or therapists, community resources, parents, or direct care givers. Initially, programming a VOCA may be a very intense task, but stay calm and stick with it. As with any other new skill, it simply takes practice and review of the VOCA manuals provided by the manufacturer.

How Does the VOCA Encourage Socialization?

In addition to learning social rituals with the VOCA, students also engage in conversation and humor. It is our experience that these are often learned beyond our expectations – a sort of experiential, incidental learning occurs. It is helpful to program in humorous quips and even jokes or riddles to expedite the process, but the most fun often comes from student "self-communication" strategies. One student, for example, tried flattery to get the teacher to cut a lesson short: he said (with the VOCA), "You are pretty." At the other end of the spectrum, of course, was the boy who put his phonics lessons to quick use by producing letter-by-letter expletives on the bus for the entertainment of all his peers. Another boy, asked to spell the word "fish," tired of demonstrating his spelling prowess, summarily turned to the food page, activated the cell with the food item "fish" on it, grinned, and quickly shut down his machine. One student established his assertiveness during a classroom discussion of the calendar and upcoming events by interjecting, "My birthday is May 3." This was an individual who was not about to be overlooked or forgotten in the "regular" routine of things. All of these instances certainly helped students express their unique personalities.

Part 3

Using the VOCA in the Community

A current trend in providing services to people with multiple disabilities is community-based training. Through this approach, these students learn to use their local community services, such as libraries, fast food and other restaurants, grocery stores, and banks. The students also participate in employment opportunities.

As mentioned previously, a VOCA is only one component of the student's entire communication system. When doing community-based training, teachers should be concerned with all aspects of the student's communication, including the following:

- Using language appropriately in social contexts (*pragmatics*); for example, having the student approach a store clerk and being close enough to be heard before making a selection.
- Being aware of timing in communication *(chronemics);* for example, responding promptly in a turn-taking situation.
- Making choices; for example, selecting items from a food menu.

Some community-related skills can be practiced in the classroom, such as the following:

- Personal identification.
- Manipulating money and numbers.
- Transporting and manipulating the VOCA and overlays.
- Efficiently using community-based vocabulary (e.g., names of the burgers at a fast food restaurant, sizes of different food items, and survival words such as "push," "in," and "restrooms").
- Turn-taking—both conversational and physical (e.g., waiting in line at a drinking fountain).

Most skills, however, are best trained in real-life situations where the student experiences all of the steps in the activity. Not only is the isolated skill learned (producing a fast food order), but the student learns the entire activity, including those events that precede and follow this skill which facilitates skill acquisition and generalization. In addition, community-based training reveals other skill areas that need to be addressed, as indicated by the following scenario.

An ambulatory VOCA user was taken to a fast food restaurant. After placing and receiving his food order, he took the food to his seat and left his VOCA on the restaurant counter. This was discussed by the educational team, with the following solution. During subsequent trips to fast food restaurants, the student was prompted to put his food tray on top of his VOCA (which was in a case), carrying both at the same time. This "trial" ended up working well, and there have been no further problems.

Another student had to learn to grasp her food tray with one hand, while carrying her VOCA (by a handle) with the other. A shoulder strap would also be an option for some students. A student in a wheelchair might have to use the VOCA to ask that the food order be placed on his or her lap tray.

As with academic studies, numerous community-based programs and training suggestions are available through national and local agencies. Just ask!

Before conducting community-based training, you should engrave the VOCA with the student's name and social security number and attach a luggage tag that provides a phone number in case it is lost. Satchels and bookbags serve as good cases for VOCAs. The devices do get lost, broken, misplaced, and stolen; and batteries go dead at the most inopportune times. If such mishaps occur, rest assured, it has probably happened to someone else, too.

There may be some environments, such as amusement parks, that are hostile to VOCA use. You should confer with the VOCA user and professionals on the advisability of taking the VOCA to such environments. You may want to make other provisions, such as using activity-specific communication boards or just the overlays of the VOCA. Before such outings, do an environmental inventory (check out the territory) and plan well in advance.

Part 4

Precautions and Troubleshooting

Helpful Hints and Precautions

Read the Manual

Even if it seems like Greek—try. Familiarity and time will comfort you. Documentation has become more readable because people took the time to read the manuals, and then voiced their frustrations to the vendors and manufacturers. Now manuals usually provide a "guided tour," which walks you through the use of the device. One valuable section is the "troubleshooting" section. This section generally makes no assumptions; it will remind you to do basic things (like check to see if the battery is charged) before you get panicky or before you call the manufacturer. In addition, this section gives you guidelines on how to organize and explain the problem to technicians. Many manufacturers also include teaching strategies that have proved very helpful to some trainers.

Know the Resident Vocabulary

Become familiar with the vocabulary residing on the device. You may not be in charge of determining the original vocabulary, but the user or the parent will know what vocabulary is really used or needed. Your familiarity with the vocabulary and where it is located will allow you to facilitate the student's access; therefore, communication will flow more smoothly.

Gather Information

Solicit information from significant others (family, former teachers, and friends) and from vendors and other people using similar technology. This will help you avoid many pitfalls, develop realistic expectations, provide for transitional use, and increase trust and acceptance levels. Also, share your gained knowledge with others. Teaching is a great way to clarify your thoughts and internalize information. We encourage you to make connections with the following national organizations: Center for Special Education Technology (800/873-8255), American Speech, Language, and Hearing Association (800/638-6868), United States Society of Augmentative and Alternative Communication (c/o ACS) (800/247-3433), and Alliance for Technology Access (415/232-0621).

Find an Expert

Seek out a competent VOCA user to give classroom demonstrations, particularly in the context of a lesson. This is a consistent recommendation of teachers, vendors, and others consulted in the preparation of this booklet.

Have Reasonable Expectations

If students are not allowed to talk out in class, have the same requirement of the VOCA user. If use of the device in a certain setting impedes learning (for example, a student in training to be a dishwasher), recognize that and deal with it. Don't feel guilty about not letting the student use the VOCA in certain situations. You may be better safe than sorry.

Make Backups

Make overlay back-ups in case of spills and losses. Also keep copies of overlays on file for easier revisions.

Avoid Hazards

Be aware of the possible hazards of moisture and static electricity. Avoid water hazards, and ground the user when static seems a likely possibility. The static electricity that people acquire in dry atmospheres can be transmitted to objects they touch (in this case a VOCA) and can cause disruption in current and a malfunction of the system. Grounding yourself on a rubber surface, particularly if you are standing on an unpainted metal surface, is a worthwhile precaution. Another remedy to prevent static discharge when turning on the VOCA is to use an antistatic softener sheet (used in home dryers). There are several commercial products available to dissipate static electricity, including antistatic mats and sprays available at most computer stores.

Stay Calm

Become a calm, effective troubleshooter, checking first for the obvious: power supply, loose connections, adjustable device features (e.g., display and volume). Know when to call for help and trust that the technicians do want to help. Be brave and resourceful . . . be a "teacher."

VOCA Troubleshooting Checklist

- ☐ Is the VOCA turned on?
- ☐ If there is a display control knob, does it need to be adjusted?
- ☐ If there is a volume control knob, or internal (software) setting, does this need to be changed or adjusted?
- ☐ Check to make sure that the overlay you are trying to use corresponds to the level or page of the program that you're in.
- ☐ Check to make sure that you are in the right "mode" (for example, spelling mode vs. language production mode).
- ☐ Does the VOCA use batteries? Have they been charged, or do they need to be charged?
- ☐ If the VOCA has been charged and still does not work, is there a short in the charger? Try using another charger. (*Please* make sure that you are using the charger that was designed for or came with your VOCA.)
- ☐ Does the device use rechargeable batteries? Have they been replaced recently? Even rechargeable batteries eventually must be replaced.
- ☐ If you are on an unpainted metal surface, *please* be sure that you ground yourself by using a rubber mat, before using your VOCA.
- ☐ Check the troubleshooting guide provided by your VOCA manufacturer.

When to Call for Help

If you need to call the vendor for assistance, it helps to have the telephone near the VOCA. Have the following information available:

- The VOCA type.
- Name, version, and serial number of the device.
- What happened or what didn't happen.
- The steps you have already taken or tried to solve the problem.

Keep serial numbers and names of equipment in a loose-leaf notebook with blank pages for recording problems and solutions.

Please keep a copy of this Checklist in a convenient location!

Appendix A

Glossary

It's exciting to embrace a new technology that holds so much promise, but there are moments of anxiety in tackling any new endeavor. Part of this anxiety occurs as you encounter new vocabulary. New fields breed new terms to express ideas or processes, and education is famous for its jargon. Just remember that the terms are simply labels for concepts that you can learn – in fact, may already know. To take the edge off, here are a few definitions of some prevalent terms in the field of AAC.

Activation: VOCAs can be accessed in a variety of ways. The most straightforward is called *direct selection,* in which the student presses a selected key or cell and the machine "talks." Another type of direct selection involves *pointing* to the cell by means of a light, which activates the chosen cell. Devices can also be accessed by other remote means: (a) a single switch for scanning (pressure, motion, lever, etc.); (b) a panel or array of switches; and (c) a joystick, track ball, or mouse. Consistent, reliable activation is perhaps one of the most important elements in effective VOCA use. Therefore, it is paramount that both trainer and student work toward that end.

Adjustments and modifications: Most devices have adjustable features that are easy to manipulate and will give you some sense of power over this machine. Displays, as suggested before, can be modified, as well as volume. As the need arises, you and your team might want to provide some external modifications to make the device more functionally and cosmetically acceptable. Modifications that can be made include: homemade carrying cases, attached handles or easels, and attached pointers for greater pressure on the cells.

Dedicated device: Voice output communication is produced by some type of computer processor. When that processor's primary or exclusive function is to process and produce communication, it is considered dedicated. Because of the memory requirements to produce speech and to store codes for speech, currently most devices are dedicated. Therefore, you need to recognize that expecting other functions (such as calculating, timekeeping, recordkeeping, or word processing) from them is probably unrealistic. In some cases, the computer base of the device is well equipped to handle these tasks, but shifting from one program to another is risky.

Digitized speech: Speech that is produced from prerecorded speech samples, either as intact words or as segments of words. Flexibility to produce novel utterances depends on how many sounds have been recorded; therefore, the more sophisticated systems use a great deal of computer memory. Although digitized speech would seem to be more intelligible and of higher quality, other factors play into the overall effect, including the speaker system of the device.

Displays: This generally refers to an LCD (light cathode display) or LED (light emitting diode), which may well enhance the intelligibility of a device by giving feedback to the sender for self-correction and providing clarification to the message receiver. Most displays feature a control that can adjust the lines for viewing at various angles.

Fixed vocabulary: This term is somewhat misleading because it applies to two kinds of VOCAs. Fixed vocabularies are the words that are programmed into the device by the manufacturer. In some cases, these cannot be altered; in other cases, you may submit revisions for the manufacturer to reprogram.

Overlays: This refers to a word or picture page that is placed over the device to indicate which key or cell will produce the intended messages. Generally these overlays are gridded and may have either words or pictures representing concepts. These cues enable the student to locate and identify keys (cells) for specific message production. (These are analogous to letters on typewriter keys.) The overlay or overlays may also be removable or duplicated and serve as a ready-made communication aid when the actual device proves too cumbersome for some situations or is in need of repair.

Power supply: Currently devices have rechargeable batteries, but caution should be taken to make

sure that they are charged the recommended amount of time with the correct cord. Frequent charging, when batteries have not been sufficiently discharged, may diminish the capacity of the battery to accept a full charge.

Programmable vocabulary: All vocabulary is "programmed"; however, this term refers to devices that can be programmed on site by trainer or student, as opposed to being returned to the manufacturer.

Synthesized speech: Speech that is produced by synthesizing (blending) a limited number of sound segments. Because it is simply a combination of established sounds, it tends to sound robotic.

VOCA: Voice output communication aid, generally a device that uses computer-generated speech for communication.

Volume control: This may refer to either a volume control dial affixed to the device, or volume control options within the VOCA software or program. In addition to volume controls, some VOCAs may include an ear jack for privacy or auditory feedback for people with visual impairments (for message selection).

Appendix B

Devices and Vendors

Adaptive Communication Systems, Inc.
354 Hookstown Grade Road
Clinton, PA 15206
800/247-3433; 412/264-2288
SpeechPAC, Alltalk, RealVoice, Dyna Vox, ScanPAC, EvalPAC with RealVoice

Artic Technologies
55 Part Street, Suite 2
Troy, MI 48083-2753
313/588-7370
Artic D'Light, Artic Crystal

Audio Bionics
9817 Valley View Road
Eden Praire, MN 55344
800/328-4827, ext. 1400
Lifestyle Personal Communicator

Canon U.S.A., Inc.
One Canon Plaza
Lake Success, NY 11042
516/488-6700
Canon Communicator M

Crabapple Systems
803 Forrest Avenue
Portland, ME 04101
207/797-2388
SpeechBox, SpeechPad

Crestwood Company
6624 North Sidney Place
Milwaukee, WI 53209
414/352-5678; FAX: 414/352-5679
Portable Pocket Computer

EKEG Electronics Company, Ltd.
P.O. Box 46199, Station G
Vancouver, BC V6R 4G5 Canada
604/273-4358
Keyboards for Speak N' Spell

Eyegaze Computer System
LC Technologies, Inc.
4415 Glenn Rose Street
Fairfax, VA 22032
703/425-7509
Eye Controlled Communicator

F. Keep Company
22501 Mt. Eden Road
Saratoga, CA 95070
408/248-2579; 408/741-5368
CATT 425 and 525

Innocomp, Innovative Computer Applications
33195 Wagon Wheel
Solon, OH 44139
216/248-6206
Say-It-All II and II Plus

Phonic Ear Inc.
250 Camino Alto
Mill Valley, CA 94941
800/227-0735; 415/383-4000
VOIS 136, VOIS 160

Prentke Romich Company
1022 Heyl Road
Wooster, OH 44691
800/642-8255; 216/262-1984 (Ohio)
IntroTalker, Smoothtalker for Light Talker and Touch Talker, Light Talker, Touch Talker

Sentient Systems Technology, Inc.
5001 Baum Boulevard
Pittsburgh, PA 15213
412/682-15213
EyeTyper 300

Shea Products, Inc.
1721 West Hamilton Road
Rochester Hills, MI 48309
313/852-4940
Special Friend Speech Prosthesis

Sonoma Developmental Center
Communication Engineering
15000 Arnold Drive
P.O. Box 1493
Eldridge, CA 95431
707/544-1573
Sonoma Voice

Dr. Douglas Sorenson
5937 Portland Avenue South
Minneapolis, MN 55417
612/866-1661
Rescue Speech System

TASH, Inc.
70 Gibson Drive Unit 12
Markham, ON L3R 4C2
Canada
416/472-2212
Talk-O

Texas Instruments, Inc.
Accessory Department
P.O. Box 53
Lubbock, TX 79408
800/842-2737
Vocaid

Venture Technologies
110-340 Brooksbank Avenue
North Vancouver, B.C. Canada V7J 2C1
604/986-9803
800/663-8931 (In U.S.)
TurboSelect™

Wayne County Intermediate School District
Attention: Greg Turner
33500 Van Born Road
Wayne, MI 48184
313/467-1415
WOLF, ScanWolf

Words+, Inc.
P.O. Box 1229
44421 10th Street, West
Suite L
Lancaster, CA 93535
805/949-8331
AudScan II, Equalizer, Talking Board

Zygo Industries, Inc.
P.O. Box 1008
Portland, OR 97207
503/684-6006
Macaw, Lightwriter, Scribe, Zygo Talking Notebook II, Switchboard

Other

Inch Associates
9568 Hamilton Avenue
Suite 104
Huntington Beach, CA 92646
INCH Assessment (International Checklist for Augmentative Communication)

Don Johnston Developmental Equipment, Inc.
P.O. Box 639
1000 North Rand Road, Building 115
Wauconda, IL 60084
312/526-2682
Oakland Schools Picture Dictionary

Appendix C

Resources

Journals and Newsletters

AAC: Augmentative and Alternative Communication Journal, Williams & Wilkins, P.O. Box 2391, Baltimore, MD 21203; 800/638-6423.

Augmentative Communication News, One Surf Way, Suite 215, Monterey, CA 93940.

Closing the Gap, P.O. Box 68, Henderson, NM 56044; 612/248-3204.

Communicating Together, Easter Seal Communication Institute, 250 Ferrand Drive, Suite 200, Don Mills, Ontario, Canada M3C 3P2.

Communication Outlook, c/o Artificial Language Laboratory, Computer Science Department MSU, East Lansing, MI 48824.

Computer Disability News, National Easter Seal Society, 2023 West Ogden Avenue, Chicago, IL 60612; 312/243-8400.

The Exceptional Parent, 1170 Commonwealth Avenue, Third Floor, Boston, MA 02134.

Organizations

Applied Science and Engineering Laboratories, University of Delaware/A. I. duPont Institute, 1600 Rockland Road, Wilmington, DE 19899; 302/651-6830.

ASHA (American Speech-Language-Hearing Association), 10801 Rockville Pike, Rockville, MD 20852-3279; 301/897-5700.

Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091; 703/620-3660.

RESNA, 1101 Connecticut Avenue NW, Suite 700, Washington, DC 20036; 202/857-1199.

TASH(The Association for Persons With Severe Handicaps), 7010 Roosevelt Way N.E., Seattle, WA 98115; 206/523-8446.

Trace Research and Development Center, 314 Waisman Center, 1500 Highland Avenue, Madison, WI 53706-2280.

USSAAC (United States Society for Augmentative and Alternative Communications), c/o ISAAC, P.O. Box 1762, Station R, Toronto, Ontario, Canada M4G 4A3.

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McNaughton, S. (Ed.). (1985). *Communicating with blissymbolics*. Toronto: Blissymbolics Communication Institute.

Musselwhite, C. R. (1986). *Adaptive play for special needs children: Strategies to enhance communication and learning*. San Diego: College-Hill Press.

Musselwhite, C. R. (1982). *Communication programming for the severely handicapped: Vocal and non-vocal strategies*. San Diego: College-Hill Press.

Silverman, F. (1980). *Communication for the speechless*. Englewood Cliffs, NJ: Prentice-Hall.

Appendix D

(This appendix is a partial printing of a Tech Use Guide developed for the Center for Special Education Technology by Beth Mineo.)

Tech Use Guide

Using Computer Technology

Augmentative and Alternative Communication

Augmentative and alternative communication (AAC) refers to any approach designed to support, enhance, or augment the communication of individuals who are not independent communicators in all situations (Beukelman, Yoder & Dowden, 1985). Communication augmentation is appropriate for those who experience difficulty with the spoken and/or written forms of expressive communication. It is important to note that an individual's communication system should not be a single device or technique, but rather a collection of techniques, devices, and strategies that can be employed as the communicative situation warrants. Components of this collection include gestures, facial expression, writing, residual speech, signal systems, non-electronic communication systems of various sizes and complexity, and electronic AAC technology.

Benefiting from AAC Approaches

AAC approaches benefit individuals with severe difficulties in speaking and/or writing. For those whose oral-motor dysfunction is so severe that speech is not intelligible, AAC approaches provide an alternate method of expression. Individuals with limited arm and hand movements can take advantage of alternate access to print capabilities. AAC approaches with spoken output can assist individuals with low vision, and AAC systems with visual display and print capabilities can assist individuals with hearing impairments. AAC approaches may also be beneficial for individuals with congitive impairments, not only as a means of expressive communication but also as a language learning tool.

"Low Tech" Approaches

There are many AAC approaches that do not involve sophisticated technology. These approaches may be implemented in isolation, but they more often serve as components in a comprehensive AAC intervention.

Signal Systems.

These systems permit an individual to call for help, attract attention, and answer simple yes/no questions. Such systems usually consist of a switch and a signal of some type. The switch is placed in proximity to a body part that the user can move easily and reliably. The signal could be a buzzer or chime, or it could be a tape-loop saying "Come here" or "I need help." Some individuals may be able to use the signal for simple coded messages (for example, one buzz means yes, two buzzes means no, three buzzes means I don't know) or for Morse code.

Communication Boards.

This term refers to any display containing vocabulary choices from which the user selects a message. Low tech communication boards are those without electronic components. They can be made using a variety of materials, including wood, plexiglass, posterboard, notebooks, and paper. Communication board displays may contain objects, letters and numbers, words, phrases, photographs, or graphic representations. Brandenburg and Vanderheiden (1988) summarized the many factors that must be considered in the design of a communication board. These include:

- The physical technique the individual will use to select message components from the display.
- The types of symbols to be used on the display.
- The vocabulary items to be included.
- The arrangement of vocabulary on the display.
- The interaction strategies that the augmented communicator will use.
- The attitudes and communication styles of the augmented communicator and potential communication partners.

An individual might have a single board that contains letters and numbers and enough words and frequently occurring phrases to meet most of his communication needs. A student might use different mini-boards for different academic subjects or for different settings (playground, mall, Sunday school). Communication

boards also serve as a back-up system should the user's electronic system fail.

"High Tech" Approaches

The incorporation of microprocessor technology into AAC systems has made a number of valuable features possible.

Large Vocabulary.

Many AAC systems offer vocabulary capacities in excess of 2,000 entries. The challenge for the user is the management of such large vocabularies, because most systems have static displays containing a finite (and relatively small) number of items. Systems such as *Say-It-All II Plus*, *scanWRITER*, and *VOIS 160* store vocabulary at a number of levels, requiring the user to activate the appropriate level as well as the correct location on the display in order to make a message selection. Users often consult a glossary that lists available vocabulary along with the activations that are required to access each item.

Several approaches have been designed to minimize the memory demands on the user. All of the devices mentioned thus far can accommodate multiple overlays, one corresponding to each memory level. A new device, *The Talking Screen*, offers a dynamic display – the display itself changes, permitting each level to be displayed without any manual changing of overlays. *The Touchtalker with Minspeak* uses multi-meaning icons to facilitate access to vocabulary items not visible on the display. The user codes his vocabulary selections with meaningful sequences of pictures, and thus doesn't need to remember a large number of letter or number codes.

Output Displays.

Many devices contain LED or LCD areas for display of messages. As the user makes a selection, the words appear in the display. This permits the user to review the message, and serves as a medium for the communication exchange between partners. Many systems also generate hard copy (print on paper), a useful feature when a permanent record of communication is desired.

Speech Output.

One of the most significant advances in AAC has been the availability of spoken output. Speech output renders technology accessible to those who cannot read and those with visual impairments. It also makes communication possible in the traditional auditory modality. Some devices, like the *Mini Talking Card Reader*, record short segments of a speaker's voice onto magnetic tape. Devices like the *Wolf* and *Touchtalker* produce synthesized speech, which is created by subjecting text to a set of pronunciation rules.

The appeal of synthesized speech is its flexibility. Any utterance that can be entered as a text string can be produced, resulting in the potential for unlimited vocabulary. The sophistication of speech synthesizers varies, as does the quality of the speech they produce. Generally, research has demonstrated that *Echo*, *Votrax*, and *Smoothtalker* speech are significantly less intelligible than *DECtalk* speech (Mirenda & Beukelman, 1987).

An alternative to synthesized speech is digitized speech. In this approach, the speech is digitally recorded, modified for storage in the system, and then re- constructed as spoken output. Although this process yields much more natural-sounding speech, it is very memory-intensive. It is also less flexible than synthesized speech because only prerecorded output can be used. Among the AAC systems offering digitized speech capabilities are the *Introtalker*, *ALLTALK*, and *Parrot*.

Input Modes.

Advances in input technology facilitate access to AAC systems for individuals with the most severe motoric limitations; almost any physical movement now can be harnessed to control communication systems. For example, the *P-Switch* can be activated by almost any muscle movement and can be used to control scanning communication systems. *Voicescribe-1000*, a voice input system with a potential 1,000-word vocabulary, can be used by individuals with consistent vocal output who need to access written communication options. *Freewheel* is a cordless device that allows head-pointing and other body motions to be used to access standard software on a personal computer.

Rate Enhancement Techniques.

Several AAC systems incorporate features that improve the efficiency of communication for the user. Prediction routines, such as those found in the *Portable Anticipatory Communication Aid* (PACA) and *Equalizer*, learn the word usage frequencies of the user. When the user begins entering a word, the system responds with the most frequently used words beginning with that letter sequence. Abbreviation routines, as found in the *RealVoice*, allow the user to access items in memory using abbreviations. For instance, the system might be programmed to produce "See you later" with the single keystrokes "C-U."

Customizability.

Each individual has unique communication needs, and it is important to be able to customize a system to meet those needs. Many systems come with a standard vocabulary, but allow the user or caregiver to program in additional vocabulary as needed. Similarly, most systems offer the consumer the option of customizing overlays to make them appropriate to the user's cognitive and linguistic abilities.

Assessment and Intervention

Every user presents a unique constellation of needs and abilities, and the range of available AAC systems expands yearly. The process of matching user needs to appropriate interventions should involve thorough evaluation and careful consideration of options.

Potential consumers of AAC interventions may demonstrate deficiencies in motor abilities, cognitive abilities, language skills, social/emotional development, and performance of activities of daily living. All of these areas should be evaluated, because AAC intervention will be affected by them and will in turn exert some influence on them. The need for such a comprehensive approach requires that input be derived from a multitude of sources. A team approach is essential, with expertise being shared among parents, potential AAC consumers, teachers, aides, speech/language pathologists, occupational therapists, physical therapists, medical personnel, ophthamologists, audiologists, educational diagnosticians, psychologists, social workers, rehabilitation engineers, and others with pertinent input. Several protocols have been developed to guide the assessment process (see Beukelman, Yorkston & Dowden, 1985 and Blackstone, Cassatt-James & Bruskin, 1988).

It should be emphasized that AAC assessment and intervention are not discrete events, but rather components of the process of assisting an individual to reach his or her highest potential. Contrary to popular belief, the process is not completed when a consumer acquires an AAC system. Understanding of AAC has matured in the past decade, and most people now realize that successful communication abilities do not emerge automatically as a function of device acquisition. Communication skills must be taught, with the goal being the achievement of *communicative competence*. Light (1989) defines a competent communicator as one whose communication is functional, adequate, and skilled in regard to the linguistic, operational, social, and strategic aspects of communication. A competent communicator is one whose communication can meet the demands of daily life. The communication does not have to be perfect, because no one is a perfect communicator. Rather, the user should demonstrate an adequate grasp of vocabulary and grammar, adequate operation of the AAC systems, appropriate interaction skills, and the ability to employ compensatory strategies to enhance communicative effectiveness.

Attention should be directed toward all of these abilities during training. Furthermore, training should be provided not only for the augmented communicator, but for the communication partners as well. Caregiver training could almost be considered a prerequisite for success. Without interested, encouraging, skillful partners, many of the augmented communicator's opportunities for learning and practice would be lost. Given the importance of early successes to later motivation and effort, it is essential that training be directed at both sides of the communication dyad.

Crucial Intervention Issues

Training Interaction Strategies.

So often people with severe expressive communication problems learn to assume a passive role in communication interactions. They get lots of practice responding, but little experience initiating. Thus, AAC intervention must include explicit instruction in interaction behaviors and strategies. AAC consumers must learn that there is no single correct way to interact with all communication partners: The interaction strategies employed should be selected on the basis of the communication task, the setting, and the skills and attitudes of the partner. Consumers must learn how to get attention, introduce topics, negotiate meaning, interrupt, convey emotion, take turns, and resolve communication breakdowns. They need to learn to work with their communication partners to maximize the successful transfer of information. Kraat (1987) provides an excellent overview of this topic.

Promoting Language and Literacy Skills.

The lack of language and literacy skills limits an individual's AAC options. Systems based on spelling, or those requiring knowledge of morphological and syntactic conventions, are inaccessible to individuals without sufficient language and literacy skills. Difficulties with these skills often hold students back from academic achievement and prevent adults from performing adequately at the job site. This topic has just recently begun to be addressed in the literature. Blau (1988) suggested a four-phase approach to developing literacy in young children that emphasizes a positive reading experience, development of a sight word vocabulary, an introduction to phonics, and the development of sentence comprehension. Very young children who have had access to a symbol-based communication system may have an inherent understanding of symbolic representation, lessening the difficulty of the transition to the written word.

Children who are nonspeaking do not have the opportunity to practice sound/letter correspondences orally, so interventionists must emphasize these relationships in other ways. Access to an AAC system may provide an individual with his first opportunities to experiment with sound combinations (if the system has voice output) and language manipulation. Cohen (1988) suggests ways in which word processing software developed for the regular education market can facilitate the development of literacy skills.

Vocabulary Selection.

An AAC consumer's communicative effectiveness and efficiency can be enhanced if the system provides access to the appropriate vocabulary. There are many techniques that one can use in making vocabulary determinations. In all cases, it is crucial to approach this task in terms of what the consumer wants and needs. Yorkston and her colleagues (1989) described several methods to employ when selecting vocabulary:

Environmental inventories - This approach to vocabulary selection involves a survey of each of the environments in which the AAC consumer interacts to determine the people and objects present and the activities that are likely to occur. From these observations, lists of potential vocabulary items can be generated.

Communication diaries - AAC system vocabulary should be updated frequently to reflect changes in the user's lifestyle and communicative interactions. To facilitate this updating, the consumer can compile a history of communications either by printing and saving all output (if the system has this capability) or by having someone record the communications for a period of time. Analysis of this record will reveal those items used frequently that are not available in the vocabulary.

Vocabulary list review - Another excellent technique is the review of vocabulary lists. It is difficult to generate vocabulary items spontaneously, but much easier to recognize appropriate words on a list. A review of standard lists is also helpful in identifying the structural words essential for grammatically correct utterances. Often these words are overlooked because the focus is on listing words that will expand the content of a user's communication.

Blau (1986) offers some guidelines for evaluating the utility of selected vocabulary. Among her criteria are:

- Can the item be used to code a variety of communicative functions?
- What is the potential for recombination of the item?
- How frequently is the item used, and in what settings?
- How much information is conveyed by the item?
- How high in reinforcement value is the item for the consumer?
- Does the item have potential for peer interaction and play?
- How much interest does the item hold for the consumer?

In determination of vocabulary, as in all aspects of assessment and intervention, *the consumer should be involved in the process to the greatest extent possible.*

Availability Information

Trace Resourcebook: Assistive Technologies for Communication, Control, & Computer Access. Available from the Trace Center.

Wallchart on Commercially-Available Communication Aids. Available from Applied Science and Engineering Laboratories.

Assistive Technology Sourcebook. Available from RESNA.

ABLEDATA [product database]. Available from Adaptive Equipment Center, Newington Children's Hospital, 181 East Cedar Street, Newington, CT 06222, 800/344-5405.

Products Mentioned in Text

ALLTALK, FreeWheel, RealVoice, Adaptive Communication Systems, Inc., 354 Hookstown Grade Road, Clinton, PA 15026, 412/264-2288.

Mini Talking Card Reader, Crestwood Company, P.O. Box 04606, Milwaukee, WI 53204, 414/461-9876.

Voicescribe-1000, Dragon Systems, Inc., 55 Chapel Street, Newton, MA 02158, 617/965-5200.

Say-It-All II Plus, Innocomp, 33195 Wagon Wheel, Solon, OH 44139, 216/248-6206.

VOIS 160, Phonic Ear Inc., 250 Camino Alto, Mill Valley, CA 94941, 415/383-4000.

Introtalker, Touchtalker, P-Switch, Prentke Romich Company, 1022 Heyl Road, Wooster, OH 44691, 216/262-1984.

Equalizer, Talking Screen, Words +, Inc., P.O. Box 1229, Lancaster, CA 93535, 805/949-8331.

Parrot, scanWRITER, PACA, Zygo Industries, Inc., P.O. Box 1008, Portland, OR 97207, 503/684-6006.

Readings

Beukelman, D. R. & Yorkston, K. M. (1989) Augmentative and alternative communication application for persons with severe acquired communication disorders: An introduction. *Augmentative and Alternative Communication, 5,* 3-13.

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Blackstone, S. W., Cassatt-James, E. L., & Bruskin, D. M. (Eds.). (1988). *Augmentative communication: Implementation strategies.* Rockville, MD: American Speech-Language-Hearing Association.

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(Ed.), *Treating language disorders: For clinicians by clinicians* (pp. 205-234). Baltimore: University Park Press.

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Brandenburg, S., & Vanderheiden, G. C. (1988). Communication board design and vocabulary selection. *The vocally impaired: Clinical practice and research* (pp. 84-133). New York: Grune and Stratton.

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Mirenda, P., & Mathy-Laikko, P. (1989). Augmentative and alternative communication applications for persons with severe congenital communication disorders: An introduction. *Augmentative and Alternative Communication, 5,* 3-13.

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Jackie Susnik received her MA in Speech Pathology from San Antonio Our Lady of the Lake University. Her area of expertise is language disorders and autism. She is currently a NDT Certified speech pathologist with the Montgomery County Public Schools multihandicapped program.

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